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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/728,070	12/04/2003	Hee Cheul Choi	STFD.055PA (S02-302)	7638
40581	7590	04/21/2006		
CRAWFORD MAUNU PLLC 1270 NORTHLAND DRIVE, SUITE 390 ST. PAUL, MN 55120			EXAMINER RAETZSCH, ALVIN T	
			ART UNIT	PAPER NUMBER
			1754	
DATE MAILED: 04/21/2006				

Please find below and/or attached an Office communication concerning this application or proceeding.

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<b>Office Action Summary</b>	Application No. 10/728,070	Applicant(s) CHOI ET AL.	
	Examiner Alvin T. Raetzsch	Art Unit 1754	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 06 February 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-25,32 and 33 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-21 is/are allowed.
- 6) ☒ Claim(s) 22-25,32 and 33 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |                                                                                                                        |                                                                                         |
|------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                            | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____                                                |

Applicant's arguments with respect to claims 22-25 & 32-33 have been considered but are moot in view of the new ground(s) of rejection.

*Claim Rejections*

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

1. Claims 22, 25, & 32 are rejected under 35 U.S.C. 102(e) as being anticipated by Mao et al. (2003/0039750 A1), alone or taken with Serp et al.

Mao teaches making a catalyst by immersing a substrate in an aqueous solution that reduces a metal salt and deposits metal nanoparticles on the substrate (see Step 1, beginning on paragraph [0018]). Iron is taught as a catalyst and alumina (although not claimed at present, silica would also be an obvious variation of this teaching) is taught as the substrate. As clearly taught by Serp (page 3089), alumina inherently has surface hydroxyl groups. Mao subsequently uses the catalyst to grow carbon nanotubes.

Claim 32: Mao teaches a substrate that inherently contains hydroxyl molecules with iron nanoparticles deposited thereon.

2. Claims 23-24 & 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mao et al. in view of Dai et al. (2001/0019238 A1), alone or also with Serp et al.

Mao teaches a process for making a supported catalyst as described with respect to claim 22 above, but does not teach oxidizing the metal particles before nanotube growth. Dai, however, teaches oxidizing iron catalyst particles on a substrate (paragraph [0036]). It would have been obvious to one of ordinary skill in the art to oxidize the metal particles of Mao in order to produce more catalytically active oxide particles and to protect against sintering as taught by Dai (paragraph [0042]).

The product by process limitations of claim 33 are only given patentable weight to the extent that they impart distinctive structural characteristics that would not be expected of the product of the prior art (see MPEP 2113). The only process differences claimed is the use of hydroxylamine, which would not be expected to impart a

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substantial product difference to other reducing agents, and the oxidation of the particles, which is addressed above with respect to claims 23-24. Once a product that appears to be substantially identical is found, the burden is on the applicant to show an unobvious difference. Applicant arguments and expert opinions are not a substitute for factual evidence.

3. Claims 32-33 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Resasco et al. (6413487), alone or taken with Serp et al.

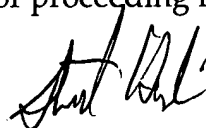
Resasco teaches a process for making carbon nanotubes that includes catalysts comprising metal nanoparticles, including iron (see claim 23), on a ceramic substrate (claim 21 & Column 7, lines 58-62) such as alumina, which inherently contains hydroxyl molecules (Serp et al.). Also taught is surface oxidized silica (Column 7, last paragraph).

The product by process limitations of claim 33 are only given patentable weight to the extent that they impart distinctive structural characteristics that would not expected of the product of the prior art (see MPEP 2113). The product that is expected to result from the claimed process limitations is iron oxide particles on a ceramic substrate that are capable of producing carbon nanotubes, which is taught by Resasco. Once a product that appears to be substantially identical is found, the burden is on the applicant to show an unobvious difference. Applicant arguments and expert opinions are not a substitute for factual evidence.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alvin T. Raetzsch whose telephone number is 571-272-8164. The examiner can normally be reached on 9-5 M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman can be reached on 571-272-1358. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

ATR



STUART L. HENDRICKSON  
PRIMARY EXAMINER